37. Tinnunculus sparverius (Linn.).

A single male, from the plain of Valencia, has the body below wholly without spots, as the bird described by Swainson as *Falco isabellinus* (An. in Men. p. 281). See v. Pelzeln's remarks on this supposed local race in his List of *Falconidæ* in the Imperial Collection (Verh. zool.-bot. Ges. 1863, p. 627).

41. Micrastur zonothorax.

Climacocercus zonothorax, Cab. Journ. f. O. 1865, p. 406.

A single skin, immature, but no doubt referable to this northern form of *M. ruficollis* sive *xanthothorax* as described by Cabanis. Whether it is really distinct we have not yet sufficient materials to give a decided opinion.

47. Crypturus strigulosus.

Tinamus strigulosus, Temm. Pig. et Gall. iii. p. 594.

Mr. Goering's skin agrees generally with the specimens in the British Museum thus marked (*cf.* Gray, List of Gall. p. 100), but has the middle of the throat pure white.

3. Notes on the Myology of *Menopoma alleghaniense*. By St. George Mivart, F.L.S., Lecturer on Comparative Anatomy at St. Mary's Hospital.

Having been engaged for some months in working at the Urodele Batrachians, the liberality of the authorities of the Royal College of Surgeons, and the kindness of my friend Mr. W. H. Flower, have placed at my disposal certain specimens well preserved in spirit of wine. One of these is the subject of the following notes.

In describing the muscles I think it better to give each a distinct name. In doing so, however, I by no means intend to imply that there is necessarily a real relation of homology between the several muscles of *Menopoma* and those of Mammals and Sauropsidans. It may well be that in many cases the resemblance is merely one of analogy, resulting from similarity of conditions.

The general form of this species is well known, with its broad and flat body, its very wide and flat head, and rounded muzzle. The tail has a rather deep cutaneous fin both above and below; but while it is continued along the whole length of the dorsum of the tail, it only extends along about the hindmost sixth of its inferior border.

The skin is nearly smooth all over, and is destitute of any tubercles or prominences. It is smoothest on the middle of the crown of the head and on the middle of the belly. Numerous short transverse wrinkles, however, extend, at short intervals, across the throat and along the whole back and belly; on the tail, on account of the great lateral compression of that organ, these wrinkles assume a vertical direction.

Two large cutaneous folds (each much convoluted and like a frill) extend backwards, one along each side of the body, from the arm-pit to a little behind and above the root of the pelvic limb.

A marked fold on each side of the neck projects round the branchial orifice, and is continued backwards from its upper border towards or over the root of the pectoral limb.

The antero-posteriorly elongated cloacal aperture is placed just behind, and not between, the pelvic limbs. Its circumference (which is of a lighter colour than the rest of the skin) is thrown into numerous small, sharp folds.

The proximal and distal divisions of each arm and leg (*i. e.* the arm and forearm and the thigh and leg respectively) are subequal in length.

The posterior digits are very broad, through cutaneous expansions.

The pectoral limb when turned forwards does not attain the angle of the mouth, nor when turned backwards does it even nearly meet the pelvic limb turned forwards.

A cutaneous fold extending along the margin of each jaw serves as a lip.

The external nostrils are very small and simple apertures close to the end of the muzzle.

The eyes, as is well known, are very small and quite destitute of eyelids.

The gape of the mouth extends backwards beyond the eye.

The head is very flat, without ridges or any marked concavities or convexities. A shallow, rather ill-defined, longitudinal depression runs along the middle of the back. The size and proportions of the specimen are as follows:—

Dimensions.

	inches.
Extreme length, measured along dorsum, from anterior end of muzzle to posterior end of tail	13·20
Length from mandibular symphysis to middle point between the arm-pits	3·00
From the said middle point to anterior end of cloaca	5·13
Length of cloacal aperture	·22
——— from anterior end of cloacal aperture to end of tail	5·07
——— of head, about	1·60
Breadth of head	1·70
Vertical thickness of head and throat	·95
——— ——— of mid-body, about	·83
Greatest breadth of body, the cutaneous lateral folds not included	1·70
Transverse thickness of tail at about its mid-length	·30
Vertical extent of tail at the same place	1·40
Distance between the eyes	1·00
——— ——— the outer nares	·40
Extreme length of pectoral limb (with manus)	1·53
Its longest digit	·40
Extreme length of pelvic limb (with pes)	1·80
Its longest digit	·50

	inches.
Distance from mid-point between the eyes to end of muzzle .	·56
Extreme width of mouth	1·55
Distance from mid-point between the angles of the mouth to the mandibular symphysis..	·65
Length from angle of mouth to branchial orifice, about	1·22
——— —— branchial orifice to root of pelvic limb, about..	·72

Proportions.

Length of head compared with its breadth at 100	94·10
Height of head compared with its breadth at 100	55·88
——— of body compared with its breadth at 100	48·82
Breadth of mid-tail to its height at 100	46·66
——— of body to its length (without head and tail) at 100	33·13
Height of body to its length at 100	16·17
Length of tail to length of body at 100	98·83
Length of pectoral limb to length of body at 100	29·82
Length of pelvic limb to length of body at 100	35·08

Myology.

On removing the skin of my specimen I do not find the fat which, according to Drs. Schmidt, Goddard, and Van der Hoeven *, exists in the hollows at the roots of the limbs in *Cryptobranchus*. Neither have I found any conspicuous cutaneous muscle or the contrast in colour which those authors have described as existing in the last-named genus between some and others of the muscles, but all are moderately pale in my specimen.

The general muscular investment of the body is, in the tail, divisible into an antero-posterior series of segments corresponding to the division of the vertebral column into vertebræ. In the trunk this divisibility is very obscurely indicated, least so towards the middle of the abdomen, where there are transverse tendinous intersections.

The muscular envelope consists of four longitudinal portions separated by four more or less marked linear divisions.

The first of these divisions extends backwards from the mid-cranial region to the end of the dorsum of the tail. It is deepest by far in the caudal region of the body, where it is filled up by a very large accumulation of fat. A fibrous membrane extends down from the bottom of this dorsal furrow to the spines and neural arches of the vertebræ, and forms a partition between the dorsal muscular mass of one side and that of the other side.

The second antero-posterior linear division extends similarly along the ventral surface of the body from the thoracic region backwards. It is only a deep furrow, however, behind the cloacal aperture; in

* Aanteekeningen over de Anatomie van den *Cryptobranchus japonicus* door Dr. F. J. J. Schmidt, Dr. Q. J. Goddard, en Dr. J. Van der Hoeven. Natuurkundige Verhandelingen van de Hollandsche Maatschappij der Wetenschappen te Haarlem. Tweede Verzameling, Negentiende Deel, Eerste stuk, 1862.

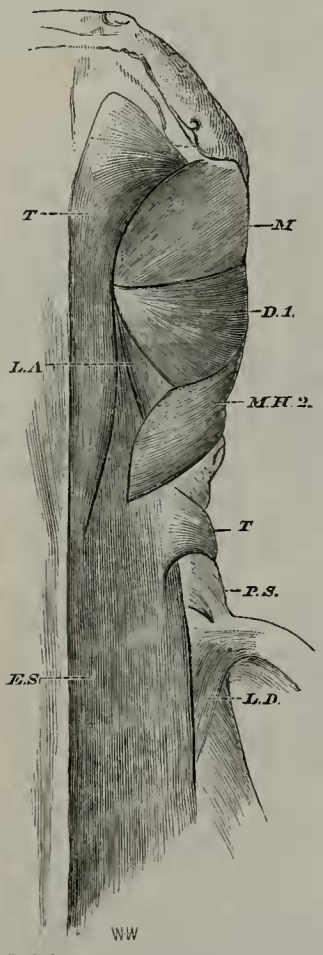
front of that orifice it is represented by a more or less marked tendinous interval, or linea alba, in the midst of the superficial muscles of the ventral portion of the abdominal muscular mass.

The third and fourth linear divisions are placed one on each side of the throat, trunk, and tail. In the throat region the anterior end of this furrow forms the gap out of which the ends of the branchial arches protrude. In the trunk it is a mere shallow furrow, dividing the dorsal part of each lateral half of the muscular mass from the ventral portion of such half.

In the trunk this linear division is situated above the middle (vertically) of the side of the body. In the tail it is situated at about the middle.

Each dorsal portion of the lateral muscular mass (*i. e.* the part

Fig. 1.



Superficial muscles of right side of head and of anterior part of trunk.

D. 1. Digastric. *E. S.* Erector spinæ. *L. A.* Levator arcuum. *L. D.* Latissimus dorsi. *M.* Masseter. *M. H.* 2. Mylo-hyoideus posterior. *P. S.* Deltoid. *T.* Temporalis. *T.* Trapezius.

between the dorsal furrow and the lateral linear division) extends from the upper surface of the skull to the distal end of the dorsum of the tail (figs. 1 & 8, *E. S*), investing the transverse processes, neural arches, and spines of the vertebræ, and also the ribs, but it has no direct connexion with either the pectoral or pelvic girdle. It forms a continuous and very thick fleshy mass, answering to the *erector spinæ* of higher animals, but not differentiated into distinct muscles. Its fibres are all antero-posteriorly directed.

Each ventral portion of the lateral muscular mass (*i. e.* the part between the lateral linear division and the middle of the ventral surface of the body and tail) presents a larger surface than does the dorsal portion of the lateral muscular mass. It extends from the basihyal to the distal end of the ventral surface of the tail, interrupted, however, by the pelvis.

As in higher vertebrata, the abdominal portion of this mass is distinguished into muscular layers with differently directed fibres; in the caudal region, however, as might be expected, this distinction does not obtain.

Muscles of the Trunk.

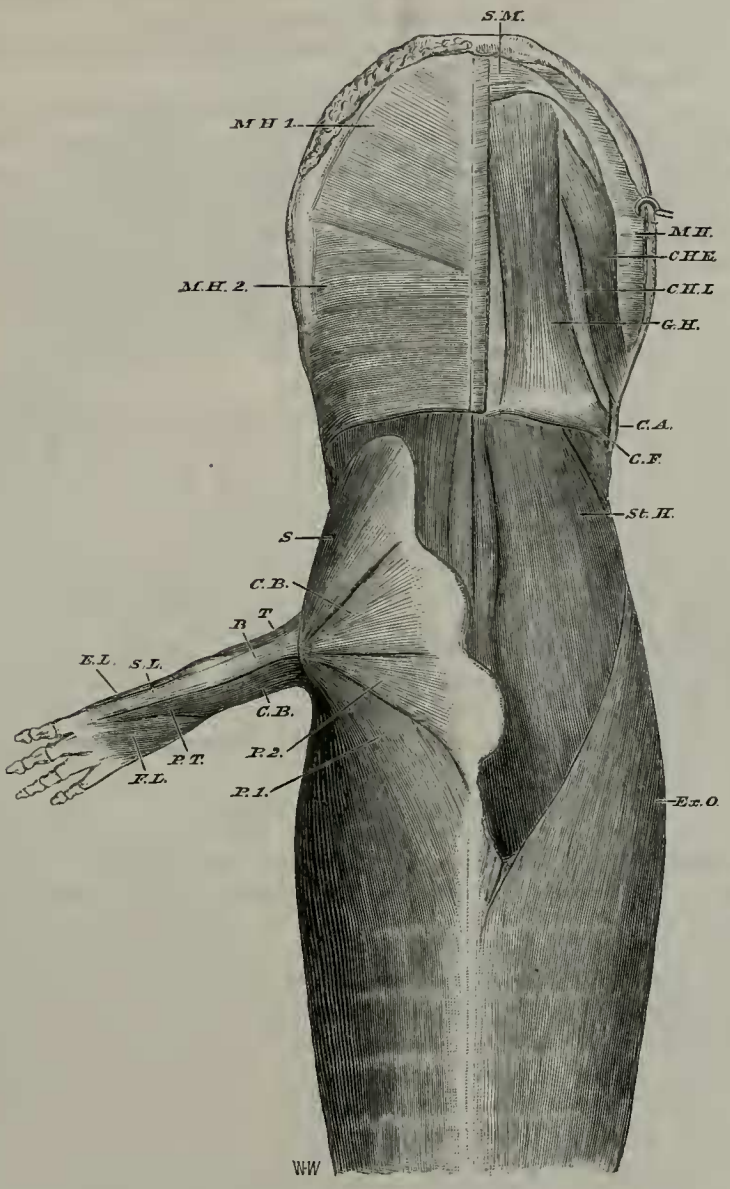
The external oblique (figs. 2, 3, 5, & 7, *Ex. O*). This is an elongated sheet of muscular fibres (with the usual direction downwards, backwards, and mesiad) extending from the lateral longitudinal furrow to the outer margin of the rectus. The muscle extends forwards as far as the scapula (passing beneath the latissimus dorsi), its anterior extremity being overlapped by the minute and oppositely directed serratus magnus. Posteriorly it is inserted into the fascia investing the root of the thigh, also with the ilium and the pubis. It fuses so gradually with the rectus that I have not succeeded in defining the line of demarcation between the two. The external oblique appears to be continued on in the caudal region as the most external portion of its infero-lateral muscular mass. This caudal continuation, however, takes fresh origin from the hinder side of the ilium.

The *internal oblique* (fig. 5, *In. O*) is the largest muscle of the body, and extends antero-posteriorly from the basihyal backwards to the end of the tail (for the pelvis seems only partially to interrupt it), and inwards from the lateral longitudinal furrow. The fibres are but very slightly oblique, very many are altogether antero-posterior in direction, and the fasciculi are very large and coarse. The muscle is thickest anteriorly and in the tail. In the pelvic region many fibres are inserted into the ilium and into the rib which articulates with the ilium, but other fibres appear to continue on altogether beneath these bones without being interrupted by them.

At its anterior end this muscle becomes indistinguishably fused with what may be a deeper part of the rectus, and which has here been called the sterno-hyoid (fig. 2, *St. H*). This is inserted into the basihyal and into the adjacent root of the first branchial arch.

Transversalis. A very delicate lamella of transversely directed muscular fibres represents this muscle. It extends in a continuous

Fig. 2.



Muscles of ventral surface. On the right side superficial muscles. On the left side deeper muscles, with removal of left pectoral limb.

B. Biceps. *C. A.* Constrictor arcuum. *C. B.* Coraco-brachialis. *C. F.* Constrictor faucium. *C. H. E.* Cerato-hyoideus externus. *C. H. I.* Cerato-hyoideus internus. *E. L.* Extensor longus. *Ex. O.* External oblique. *F. L.* Flexor longus. *G. H.* Genio-hyoideus. *M. H.* 1. Mylo-hyoideus anterior. *M. H.* 2. Mylo-hyoideus posterior. *P.* 1. & *P.* 2. Pectoralis. *P. T.* Pronator teres. *S.* Subclavius. *S. L.* Supinator longus. *S. M.* Submentalis. *St. H.* Sterno-hyoideus. *T.* Triceps.

sheet from the region of the heart backwards to the inside of the pelvis. It does not seem to extend so far inwards towards the middle line of the body as does the internal oblique.

The abdominal nerves pass along between this muscle and the internal oblique.

Rectus. This muscle consists, as usual, of antero-posteriorly directed fibres in the middle of the abdomen, but is very difficult accurately to define. It seems to be overlapped externally by some of the fibres of the external oblique, while internally it is closely adherent to what is either a deeper portion of the rectus or the median part of the internal oblique, and which runs forwards (with the scapular arch, except the sternum, altogether superficial to it) to be inserted, as before said, into the basihyal. The external portion of the rectus is inserted anteriorly into the sternum, posteriorly into the anterior part of the pelvis.

Retrahens costarum. This elongated muscle passes antero-posteriorly, on each side of the spine, beneath the bodies of all the trunk-vertebræ, being attached to them and to the ribs down to their extremities, where it is closely connected with the fascia of the transversalis. The muscle gets thinner and smaller backwards, and appears to end at the commencement of the caudal region; but anteriorly it enlarges and passes, as a fleshy mass, beneath the skull. Throughout the trunk this muscle is separated from the dorso-lateral muscular mass by the internal oblique and transversalis; but where these diverge from that mass to leave space for the branchial arches, there the muscle now described becomes applied to the under surface of the dorso-lateral mass, and more or less closely connected with it.

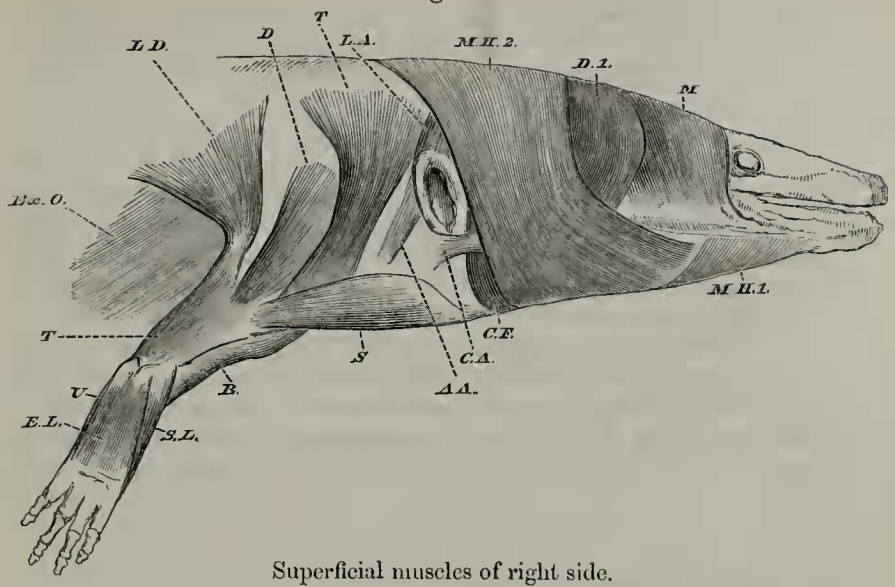
Muscles of the Head.

Temporalis. This (fig. 1, *T.*) is the most anterior of all the muscles on the dorsal aspect of the body, its anterior margin even extending forwards in front of the eyes. It is not a completely distinct muscle, as its hinder end is but imperfectly separated from the innermost part of the dorsal lateral mass of the same side; of which it, in part, may therefore be considered the extreme anterior prolongation. It also takes origin, by fascia, from the first three neural spines and from the anterior part of the upper surface of the skull—Cuvier's frontal. The most anterior fibres slope backwards; but all converge, and passing behind the eyeball, are ultimately attached, by means of a strong tendon, to the inner side of the summit of the mandible just in front of its articulation with the suspensorium, and behind and somewhat within the insertion of the masseter.

The *pterygoid.* Dr. Fischer* describes this muscle as arising from the side of the skull and from the upper surface of the pterygoid, and with a similar insertion to the temporal, from which it is very indistinctly separable. In my specimen it seems to be so intimately united with the temporal that I cannot but doubt its distinctness.

* Anatomische Abhandlungen über die Perennibranchiaten und Derotremen. Hamburgh, 1864, p. 63.

Fig. 3.



Superficial muscles of right side.

A. A. Adductor arcuum. *B.* Biceps. *C. A.* Constrictor arcuum. *C. F.* Constrictor faucium. *D.* Deltoid. *D.* 1. Digastric. *E. L.* Extensor longus. *Ex. O.* External oblique. *L. A.* Levator arcuum. *L. D.* Latissimus dorsi. *M.* Masseter. *M. H.* 1. Mylo-hyoideus anterior. *M. H.* 2. Mylo-hyoideus posterior. *S.* Subclavius. *S. L.* Supinator longus. *T.* Trapezius. *T.* Triceps. *U.* Ulnaris.

Masseter (figs. 1, 3, & 5, *M*). This is an exceedingly thick muscle, which arises from the anterior surface of the suspensorium as far as the margin of the parietal. It is inserted into the upper border and outer surface of the posterior part of the mandible. It covers externally the descending terminal portion of the temporal, which runs down in a sort of groove on its inner surface.

The *digastric* (figs. 1, 3, & 5, *D.* 1 & *D.* 2) is a very large and powerful muscle, consisting of two parts, which are together inserted into the posterior extremity of the mandible. The hinder portion of the muscle arises from the dorsal fascia, closely connected with the similarly arising part of the posterior mylo-hyoid, and overlapping the levator arcuum. The anterior portion takes origin from the occiput, the hinder surface of the suspensorium. Both portions pass over the cornu of the hyoid (without being directly connected with it) to their before-mentioned insertion.

Levator arcuum (figs. 1 & 3, *L. A*). This is a small delicate layer of fibres springing from the dorsal fascia in the angle between the digastric and the temporal. Passing obliquely downwards and backwards, and covered, more or less, by the hinder part of the digastric and the posterior mylo-hyoid, the fibres go to the dorsal segments of the last three branchial arches as Fischer has described*.

Mylo-hyoideus anterior (figs. 2 & 3, *M. H.* 1). This forms, with

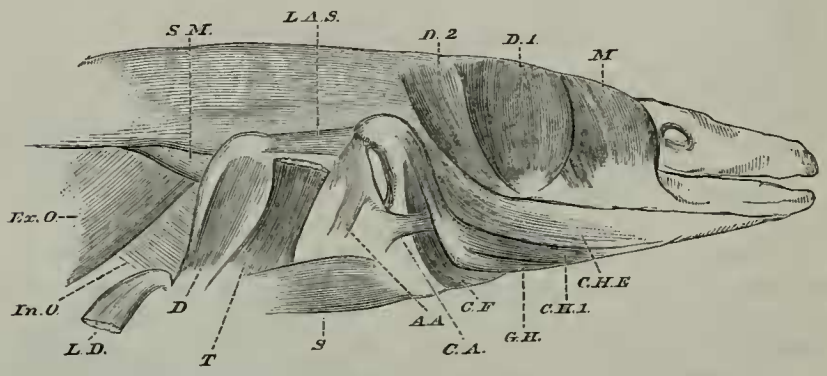
* *L. c.* p. 83, tab. 4. fig. 2, *la.*

its fellow of the opposite side, a thin transverse sheet of muscular fibres immediately beneath the skin. It springs from the inner surface of the lower margin of the mandible, almost as far backwards as the articulation of the latter with the suspensorium. Its fibres incline slightly backwards; and a sort of faint *linea alba* is interposed between it and its fellow of the opposite side.

The *mylo-hyoideus posterior* (figs. 1, 2, & 3, *M. H.* 2), with its fellow, forms another thin transverse sheet of muscular fibres placed immediately beneath the skin, except where the mylo-hyoideus anterior is superficial to it. It springs from the dorsal fascia and from that over the cornu of the hyoid, and covers the hinder portion of the digastric and part of the levator arcuum.

Submentalis (fig. 2, *S. M*). This small, azygos, transverse muscle connects together the anterior ends of the two mandibular rami. It is placed immediately above the most anterior portions of the mylo-hyoidei anteriores, and is much connected with them and with the genio-hyoidei.

Fig. 5.



Deeper muscles of right side, the *mylo-hyoidei*, the *trapezius*, and the *latissimus dorsi* being removed or cut short.

A. A. Adductor arcuum. *C. A.* Constrictor arcuum. *C. F.* Constrictor faucium. *C. H. E.* Cerato-hyoideus externus. *C. H. I.* Cerato-hyoideus internus. *D.* Deltoid. *D.* 1 & *D.* 2. Digastric. *Ex. O.* External oblique. *G. H.* Genio-hyoideus. *In. O.* Internal oblique. *L. A. S.* Levator anguli scapulæ. *L. D.* Latissimus dorsi. *M.* Masseter. *S.* Subclavius. *S. M.* Serratus magnus. *T.* Trapezius.

*Constrictor faucium** (figs. 2, 3, and 5, *C. F*). This muscle springs from the under surface of the dorsal segment of the second branchial arch (*i. e.* the second after the hyoidean cornu), and is inserted into a fascia beneath the throat, into which the genio-hyoid of the same side is also inserted. As the constrictor faucium passes downwards it is overlapped (and strapped in, as it were) by the band-like constrictor arcuum.

The *constrictor pharyngis* is a delicate muscular sheet arising

* Constrictor faucium internus of Schmidt, &c., see *l. c.* p. 29, and pl. 6. fig. xiii. 4.

partly from the postero-ventral border of the last branchial arch*, partly from the fascia of the side of the neck behind the branchial arches†. Thence it descends to the middle line of the body beneath the trachea, and above the sterno-hyoid, which latter is superficial to it.

Genio-hyoideus‡ (figs. 2 & 5, *G. H*). On removing the mylo-hyoidei, the two genio-hyoidei are seen running backwards (one on each side) from the symphysis of the mandible. Each genio-hyoid arises from the anterior part of the ramus of the mandible of its own side (more or less connected with the submentalis), and is inserted posteriorly into the fascia, which also receives the insertion of the constrictor faucium.

The *cerato hyoideus externus* (figs. 2 & 5, *C. H. E*) is a considerable muscle which arises from the first branchial arch, and is inserted into the cornu of the hyoid towards its middle.

The *cerato-hyoideus internus* (figs. 2 & 5, *C. H. I*) can hardly perhaps be reckoned a distinct muscle in *Menopoma*, in which it has a common insertion with the muscle last noticed. It arises, however, from the ventral segment of the second branchial arch.

Constrictor arcuum (figs. 2, 3, & 5, *C. A*). This small band-like muscle arises from the first branchial arch, and is inserted into the last two branchial arches. Fischer says§, no doubt correctly, that the muscle consists of two layers, the superficial one being inserted into the last branchial arch, and the deeper layer into the penultimate branchial arch. This muscle overlaps and binds down the constrictor faucium.

The *adductor arcuum* (figs. 3 & 5, *A. A*) is a very small muscle, arising from the fascia on the ventral surface of the sterno-hyoid. Passing upwards and outwards, it goes to the last branchial arch.

Sterno-hyoideus (fig. 2, *St. H*) A considerable muscular mass, which may conveniently be distinguished by this name‖, though in fact it is the anterior termination of that great ventral muscular mass which consists of the united internal oblique and rectus. Its insertion is into the posterior part of the under surface of the basi-hyal and the adjacent parts of the ventral segments of the branchial arches.

The antero-internal portion of the ventral part of each sterno-hyoid shows a slight indication of distinctness as a muscular fasciculus inserted into the fascia into which the genio-hyoideus is inserted. This appears to represent, in a rudimentary manner, the distinct muscle named levator maxillæ inferioris brevis by the Dutch authors¶.

* The hyo-trachealis of Fischer, *l. c.* p. 92.

† The dorso-trachealis of Fischer, *l. c.* p. 92.

‡ The levator maxillæ inferioris longus of Schmidt, &c., see *l. c.* p. 29, pl. 6. fig. xiii. 5.

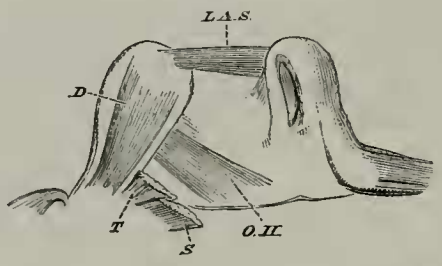
§ *L. c.* p. 75, and tab. 4. fig. 2, *ca*.

‖ It is so by Dr. Fischer, see *l. c.* p. 104, and tab. 4. fig. 2, *sh*. It is the cerato-hyoideus of the Dutch authors, Schmidt &c., see *l. c.* p. 30, pl. 6. fig. xiii. 9.

¶ See Schmidt &c., p. 30, and pl. 6. fig. xiii. 6.

Omo-hyoideus (fig. 6, *O. H*). This is a flat band of muscle which springs from the lower part of the anterior margin of the scapula, and, passing forwards, downwards, and inwards, loses itself in the lateral part of the sterno-hyoid, with which it coalesces.

Fig. 6.



Deepest muscles of outside of right shoulder, the *trapezius* and *subclavius* being cut short to show the *omo-hyoid*.

D. Deltoid. *L.A.S.* Levator anguli scapulæ. *O.H.* Omo-hyoideus. *S.* Subclavius. *T.* Trapezius.

Genioglossus. I have not succeeded in defining this muscle; but, according to Dr. Fischer*, it is represented by some fibres which pass from the hinder surface of the mandibular symphysis to the skin of the mouth. This is not the genioglossus of Schmidt &c., which is my submentalis†.

Appendicular Muscles.

Pectoral Limb.

Trapezius (figs. 1, 3, 5, & 6, *T*). This is a small subtriangular muscle which arises from the fascia outside the trunk-muscles, and immediately behind the levator arcuum and mylo-hyoideus externus. Passing downwards and slightly backwards, it is inserted into the angle between the scapula and the precoracoid (of Parker), but mainly into that side of the angle which is formed by the lower end of the anterior margin of the scapula.

The *latissimus dorsi* (figs. 1, 3, & 5, *L. D*) is a small triangular muscle of about the same size as the trapezius. It arises from the fascia outside the dorsal muscles, and, passing downwards and forwards, is partly inserted into the head of the humerus, and, partly fusing with the triceps, is continued on by that muscle to the proximal end of the ulna.

The *pectoralis* (fig. 2, *P.* 1 & *P.* 2) consists of two parts with a common insertion. The first and larger part springs from the surface of the superficial abdominal muscles; the second portion from the sternum. They are inserted into the inner side of the radial (greater) tuberosity of the humerus.

Serratus magnus (fig. 5, *S. M*). This very small muscle arises

* *L. c.* p. 66. † *L. c.* tabb. 6, 7.

from the lateral muscular mass just at the lateral longitudinal groove, and is inserted on the inner side of the upper part of the scapula.

The *levator anguli scapulæ* (fig. 5, *L. A. S*) is the antagonist of the muscle last described. It is very long and slender, and arises from the hinder and inferior margin of the exoccipital, and is inserted into the upper part of the inner side of the scapula.

The *omo-hyoid* has been already described as the last but one of the muscles of the head.

The *subclavius** (figs. 2, 3, 5, & 6, *S.*) arises from the outer surface of the precoracoid (of Parker) and, passing backwards beside the coraco-brachialis, and more or less connected with the latter, is inserted into the summit of the great tuberosity.

Coraco-brachialis (fig. 2, *C. B*). This muscle is large, and consists of two parts. The first of these springs from the whole surface of the coracoid, and is partly covered up by the pectoralis; it is inserted into the inner side of the radial tuberosity of the humerus. The second part, thick and long, arises from the posterior margin of the coracoid, close behind the glenoid cavity; passing down into the bend of the elbow-joint, it is inserted into the shaft of the humerus down to the internal condyle.

Deltoid (figs. 3, 5, & 6, *D*). A muscle which may perhaps answer to the deltoid of higher forms springs from the outside of the scapula, and passing down is inserted into the outer side of the radial tuberosity, near its summit.

Subscapularis. A very small triangular muscle, springing from the inner side of the scapula close to the glenoid surface, and implanted into the humerus. It passes between the two heads of the triceps, which spring from the scapular arch.

Biceps (figs. 2 & 3, *B*). This muscle, which appears to answer both to the biceps and brachialis anticus of higher animals, consists perhaps of two parts, though one is with difficulty separable from the long coraco-brachialis. This latter portion springs from the posterior margin of the coracoid, close to the glenoid surface; and a strong tendon runs along it. The other part arises from the front of the shaft of the humerus, immediately below the insertions of the pectoralis and subclavius. The muscle is partly inserted into the shaft of the radius, and in part fuses with the supinator longus.

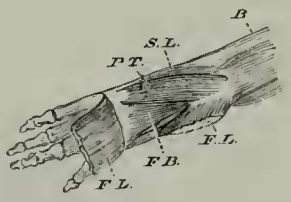
Triceps (figs. 2 & 3, *T*). This is a large muscle arising partly, by a considerable head, from the junction of the scapula and coracoid just in front of the glenoid surface, by another and much smaller head from the inner surface of the coracoid, just behind the glenoid surface. It also takes origin from the inner and outer surfaces of the humerus near its summit, and it receives an accession by the union of the latissimus dorsi. It is implanted into the proximal end of the ulna.

Supinator longus (figs. 2, 2A, 3, & 4, *S. L*). A thick muscle which may be thus named springs from the radial side of the lower

* Prof. Rolleston has shown, I think conclusively, that my epicoraco-humeral is really the subclavius; and the muscle here described in *Menopoma* may probably be the same as my epicoraco-humeral.

part of the humerus, and is inserted into the same side of the radius towards and at its distal end, some fibres seeming to run on to the carpus.

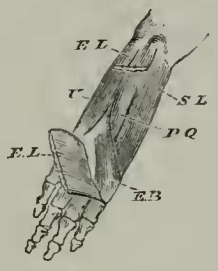
Fig. 2A.



Deeper flexor muscles of right forearm, the *flexor longus* cut and reflected.

B. Biceps. *F. B.* Flexor brevis. *F. L.* Flexor longus. *S. L.* Supinator longus. *P. T.* Pronator teres.

Fig. 4.



Deeper muscles of extensor surface of right forearm, the *extensor longus* cut and reflected.

E. B. Extensor brevis. *E. L.* Extensor longus. *P. Q.* Pronator quadratus. *S. L.* Supinator longus. *U.* Ulnaris.

Ulnaris. A muscle which extends along the ulnar border of the forearm (figs. 3 & 4, *U*), arises from the ulnar side of the lower end of the humerus, and is inserted along the corresponding border of the ulna. Some fibres coming from the radial condyle of the humerus, and fusing with this muscle, doubtless represent the extensor ulnaris of higher animals.

The *pronator teres* (figs. 2 & 2A, *P. T*) is a rather large muscle. It springs from the lower end of the ulnar border of the humerus, and is inserted into about the distal half of the radius. Although a wide muscle, only the narrow edge of it is seen before the removal of the flexor longus.

Extensor longus (figs. 2, 3, & 4, *E. L*). This arises from the radial border of the lower end of the humerus, and, expanding as it passes downwards, is inserted by fascia into the digits.

Extensor brevis (fig. 4, *E. B*). A subtriangular muscle may perhaps be thus named which arises from the distal part of the radial side of the ulna and from the carpus, and goes mainly to the radial digit. It may perhaps represent the extensor pollicis.

Pronator quadratus (?) (fig. 4, *P. Q*). A small muscle passes

downwards, and radiad between the ulnaris, the supinator longus, and the extensor brevis. It arises from the proximal end of the ulna; and some fibres seem to come from the internal condyle. It is inserted into the ulnar aspect of the radius.

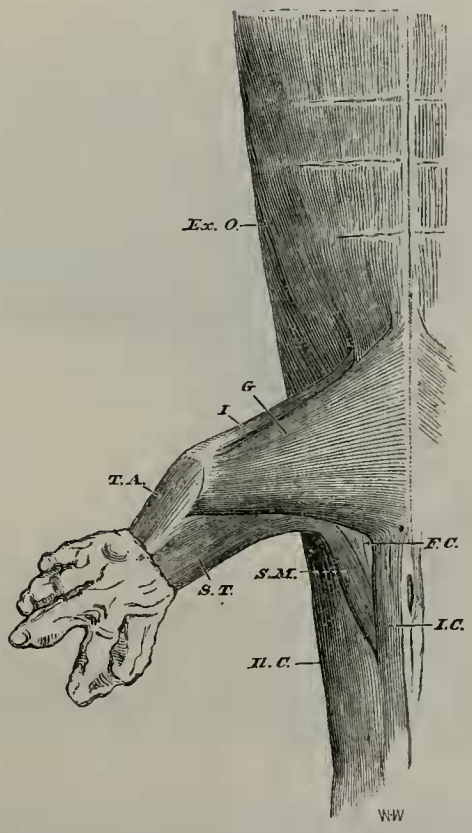
Flexor longus (figs. 2 & 2A, *F. L*). This muscle springs from the ulnar border of the lower end of the humerus, and, passing downwards and expanding, goes to the palm of the manus, and is inserted by delicate tendons into the digits.

Flexor brevis (fig. 2A, *F. B*). A short triangular muscle which may be thus named arises from the ulna and the palmar surface of the carpus, and, passing downwards and expanding, goes to the digits.

Pelvic Limb.

Semimembranosus (figs. 7, 8, 9, & 10, *S. M*). This small muscle, which may perhaps be but a second head of the semitendinosus, arises from the underside of the caudal vertebræ at about the fourth

Fig. 7.



Superficial muscles of ventral surface of right side.

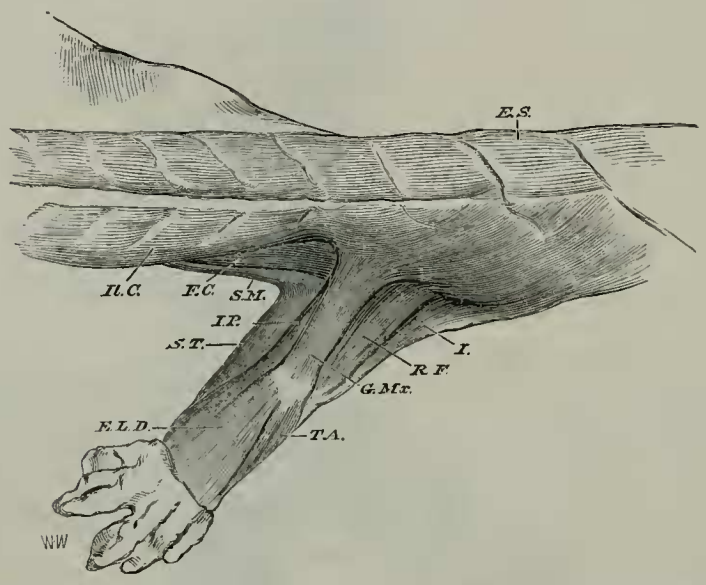
Ex. O. External oblique. *F. C.* Femoro-caudal. *G.* Gracilis. *I.* Iliacus. *I. C.* Ischio-caudal. *Il. C.* Ilio-caudal. *S. M.* Semimembranosus. *S. T.* Semitendinosus. *T. A.* Tibialis anticus.

postsacral. It comes to the surface between the adjacent sides of the femoro-caudal and ischio-coccygeal muscles, and is inserted into the posterior edge of the semitendinosus a little after the latter muscle has left the ischium.

The *ischio-caudal* (figs. 7 & 10, *I. C*) passes forwards beside the cloacal aperture, and therefore forms the most median part of the subcaudal muscular mass. It springs from the hypapophyses of the first four caudal vertebræ, and is inserted into the postero-external angle of the ischium.

Femoro-caudal (figs. 7, 8, 9, & 10, *F. C*). A rather large muscle which I thus name comes out of a sort of muscular sheath on each side of the proximal part of the under half of the tail. The sheath is formed by the ilio-caudal above, and by the semimembranosus below; and the muscle springs from the sides of the hypapophyses of two or three of the anterior caudal vertebræ. It is inserted by a strongish tendon into the flexor surface of the femur just below the great trochanter, just behind and outside of part of the insertion of the adductor.

Fig. 8.



Superficial muscles of outer side of hinder part of trunk and anterior part of tail, and of the dorsal (extensor) side of right pelvic limb.

E. S. Erector spinæ. *E. L. D.* Extensor longus digitorum. *F. C.* Femoro-caudal. *G. Mx.* Gluteus maximus. *I.* Iliacus. *Il. c.* Ilio-caudal. *I. P.* Ilio-peroneal. *R. F.* Rectus femoris. *S. M.* Semimembranosus. *S. T.* Semitendinosus.

Ilio-caudal (figs. 7, 8, 9, & 10, *Il. C*). This is that part of the infero-lateral caudal muscular mass which is inserted into the posterior aspect of the ilium. The insertion is just above the origins of the gluteus maximus and biceps.

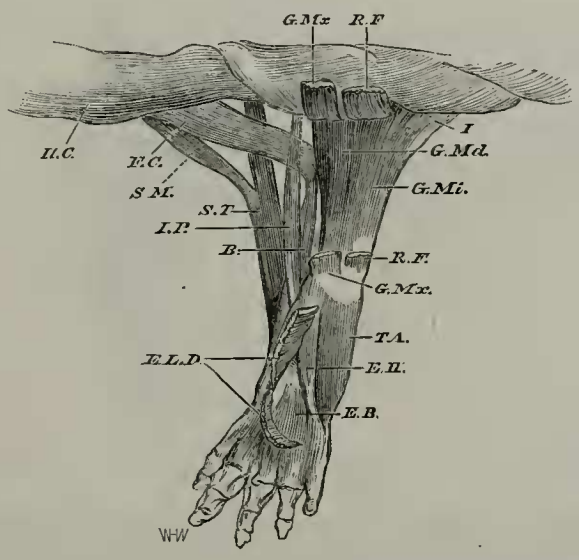
Gracilis (figs. 7 & 10, *G*). A very large sheet of muscle may

perhaps be thus named. It is thickest posteriorly, and arises from the whole length of the much prolonged pubo-ischiatic symphysis. It is inserted into the postero-peroneal surface of the upper half of the tibia.

The *adductor* (figs. 10 & 11, *A*) is a very thick mass of muscle which arises from the whole ventral surface of the pelvic shield between the acetabulum and the pubo-ischiatic symphysis, and is covered by the gracilis. It is inserted into the postero-tibial surface of the femur down to the intercondyloid space, where its insertion is widest.

Semitendinosus (figs. 7, 8, 9, 10, & 11, *S. T*). A muscle I venture, suggestively, thus to designate, arises from the postero-external angle of the ischium, just at the insertion of the ischio-caudal. It is inserted, passing downwards, into the outside of the lower part of the flexor longus digitorum, on its plantar surface. A little after leaving the ischium it is joined by the before described semimembranosus.

Fig. 9.



Deeper muscles of dorsal or extensor surface of right pelvic limb, the *gluteus maximus*, *rectus femoris*, and *extensor longus* being cut and reflected.

B. Biceps. *E. B.* Extensor brevis. *E. H.* Extensor hallucis. *E. L. D.* Extensor longus digitorum. *F. C.* Femoro-caudal. *G. Md.* Gluteus medius. *G. Mi.* Gluteus minimus. *G. Mx.* Gluteus maximus. *I.* Iliacus. *Il. C.* Ilio-caudal. *I. P.* Ilio-peroneal. *R. F.* Rectus femoris. *S. M.* Semimembranosus. *S. T.* Semitendinosus. *T. A.* Tibialis anticus.

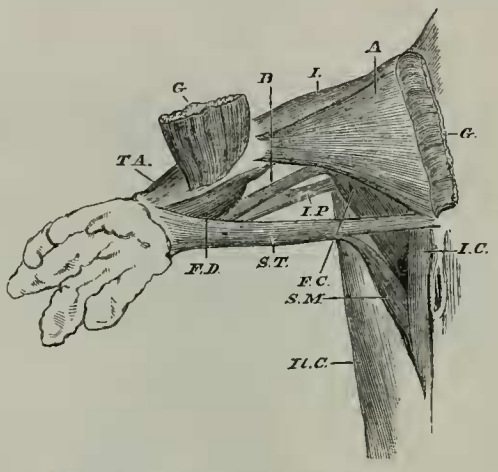
Iliacus (figs. 7, 8, 9 & 10, *I*). This is a very considerable muscle, and arises from the anterior part of the internal (abdominal) surface of the pubic shield. Curving over the anterior margin of that shield, it is inserted into the lower two-thirds of the femur, down to the tibial condyle; but no fibres extend to the tibia itself.

Gluteus maximus (figs. 8 & 9, *G. Mx*). An elongated, but tolerably wide muscle (which I provisionally distinguish by this name) springs from the outside of the lower part of the ilium, and, passing downwards, ends in an aponeurosis which invests the knee anteriorly, and passes to the upper part of the front of the tibia.

Rectus femoris (fig. 8 & 9, *R. F*). This is very similar in shape and size to the preceding. It arises from the pelvis immediately in front of the gluteus maximus and of the acetabulum, and, passing downwards on the tibial side of the last-named muscle, is inserted by aponeurosis into the inner side of the upper part of the tibia.

Gluteus medius (?) (fig. 9, *G. Md*). A small muscle invests the outer side of the femur, somewhat as a vastus externus. It arises, however, from the ilium just above the acetabulum. Passing downwards, covered by the gluteus maximus, it is inserted into the front and peroneal side of the shaft of the femur down to near the external condyle.

Fig. 10.



Deeper muscles of ventral or flexor surface of right pelvic limb, the *gracilis* being cut and reflected.

A. Adductor. *B.* Biceps. *F. C.* Femoro-caudal. *F. D.* Flexor digitorum. *G.* Gracilis. *I.* Iliacus. *I. C.* Ischio-caudal. *Il. C.* Ilio-caudal. *I. P.* Ilio-peroneal. *S. M.* Semimembranosus. *S. T.* Semitendinosus. *T. A.* Tibialis anticus.

Gluteus minimus (?) (fig. 9, *G. Mi*). This is a still smaller muscle than the preceding, and arises from the hinder surface of the ilium and immediately opposite the origin of the gluteus medius, being separated from it only by the ilium. Passing downwards it is inserted beside the last-named muscle, with which it is intimately connected.

Ilio-peroneal (figs. 9 & 10, *I. P*). A muscle which I propose thus to designate, and which is very long and slender, arises from the ilium immediately beneath and closely connected with the gluteus maximus. It is inserted into the peroneal side of the fibula slightly above its middle.

The *biceps* (?) (figs. 9 & 10, *B*) is slender, like the muscle last described; it extends from the insertion of the femoro-caudal to the fibula, being fixed to that bone immediately below the attachment of the ilio-peroneal. It expands somewhat just before its insertion.

Tibialis anticus (figs. 7, 8, 9, 10, & 11, *T. A*). This is a large and prominent muscle. It arises from the front of the distal end of the femur and from the proximal parts of the tibia and fibula. It is inserted into the tarsus on its tibial side.

Peroneus. A portion of muscle, somewhat difficult to define exactly, passes down, in front of the insertions of the ilio-peroneal and biceps, from the head of the fibula to the peroneal side of the tarsus.

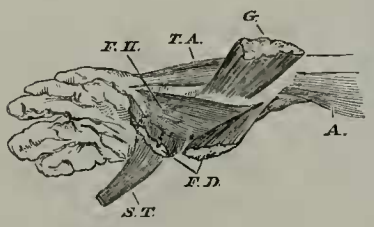
Extensor longus digitorum (figs. 8 & 9, *E. L. D*). This large muscular layer arises, by a strong aponeurosis, from the front of the distal end of the femur. Passing downwards it goes to the digits.

Extensor hallucis (?) (fig. 9, *E. H*). A rather delicate muscle, covered by that last described. It goes from the upper part of the fibula downwards to the hallux.

Extensor brevis digitorum (fig. 9, *E. B*). A small triangular muscle, placed on the peroneal side of that last described, passes down obliquely from the lower end of the fibula to the four peroneal digits.

Flexor digitorum (figs. 10 & 11, *F. D*). This considerable muscle comes into view when the expanded lower part of the semitendinosus is removed. It arises from the posterior surface of the peroneal condyle of the femur, and passes downwards to the pedal digits.

Fig. 11.



Deepest muscles of ventral or flexor surface of right pelvic limb, the *semitendinosus* and *flexor digitorum* being cut and reflected.

A. Adductor. *F. D.* Flexor digitorum. *F. H.* Flexor hallucis. *G.* Gracilis. *S. T.* Semitendinosus. *T. A.* Tibialis anticus.

Flexor hallucis (?) (fig. 11, *F. H*). On the removal or reflection of the flexor digitorum, a deeper layer of muscle, subtriangular in shape, comes into view. It arises from the whole length of the fibula, and passes obliquely downwards to the sole of the foot. It goes mainly, if not exclusively, to the hallux.

Peroneo-tibial (?). Some muscular fibres connect the lower part of the tibia and fibula, passing obliquely from the latter bone downwards and inwards to the former.